

SPECIAL REPORTS

The Unknown Disruptor Accelerating the Future of Batteries

Today's batteries are failing us, but this disruptive technology company is on the cusp of big change

By Luke Lango August 5, 2021

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Traditionally, batteries make things work.

Batteries are what power our phones. Batteries are what drive our electric cars.
Batteries are what run our laptops.

Batteries make things work.

But, today, ***batteries are actually keeping things from working as well as they could.***

That may seem counterintuitive to you. I see why. Without batteries, none of the modern technology we use each day – phones, computers, cars, watches, TVs – would work.

But those machines aren't working as well as they could because the battery isn't working as well as it could.

Why does it take your phone four hours to fully charge?

How come your laptop doesn't last without a power connection for days?

Why can't your electric car drive for thousands of miles on one charge?

The answer, to all of those questions, is that the batteries in those machines simply won't allow it.

To understand why, we need to take a quick trip back to chemistry class...

Batteries comprise three things. A **cathode**, an **anode**, and an **electrolyte**. Batteries work by promoting the flow of ions between the cathode and anode through the electrolyte.

Conventional lithium-ion batteries – which are currently the dominant status quo in smartphones, smartwatches, electric cars, so on and so forth – are built on liquid battery chemistry.

That is, they comprise a solid cathode and a solid anode, with a liquid electrolyte solution connecting the two.

These batteries have worked wonders for years. But, due to the physical constraints of dealing with a liquid electrolyte, they are now reaching their limit in terms of energy cell density.

That is, you can only compress a liquid so much. That's just Chemistry 101. So, these batteries can only get so small and can only pack in so much charge.

We are now reaching those limits – which means that conventional lithium-ion batteries will physically never be able to charge your phone in minutes, or make your laptop last for days, or drive your electric car for thousands of miles on one charge.

It's not going to happen.

So, if we want our phones, watches, and electric cars to last longer and charge faster, ***we need a fundamentally different battery.***

Enter the **solid-state battery**.

With solid-state batteries, the name pretty much says it all.

You take the liquid electrolyte solution in conventional batteries and compress it into a solid, creating a hyper-compact solid battery that – because it has zero wasted space and theoretically infinite energy cell density – lasts *far* longer and charges *far* faster.

Of course, the implications of solid-state battery chemistry are **huge**.

Solid-state batteries could be the key to making our phones sustain power for days... enabling our smartwatches to fully charge in seconds... and allowing electric cars to drive for thousands of miles without needing to recharge.

But making solid-state batteries is no walk in the park – perhaps not surprisingly, fundamentally changing the world's battery science is a complex, costly process.

Specifically, adoption of solid-state batteries has been essentially non-existent – despite their theoretical superiority – for two major reasons:

1. They are exceptionally **expensive** to make, because of expensive anode costs, a lack of manufacturing scale, and lack of understanding as to what solid electrolyte solutions work best for the battery.
2. They tend to short-circuit because of something called “**dendrites**” that form in the solid electrolyte substance over time – these dendrites are basically small cracks that render the battery useless.

No one yet has figured out how to side-step these obstacles and affordably (or sustainably) make highly effective solid-state batteries on a mass scale...

Until now.

When one small, unknown disruptive startup introduced a breakthrough technological process, which will pave the path for solid-state batteries to go from promising science concept to disruptive reality.

This company will fundamentally change our world and unlock **huge** shareholder gains along the way.

The World's Best LiDAR Company Is Ready for Breakneck Growth



Readers meet **QuantumScape (QS)**, a solid-state lithium EV battery that is the market's high-quality pure-play on the solid-state battery revolution.

QuantumScape is such an exciting company — and QS stock is such an *exciting investment opportunity* — because this is an emerging battery tech company that is leveraging its novel and breakthrough technology to turn the promising theory of solid-state batteries into an explosive reality.

Specifically, QuantumScape has figured out how to reduce solid-state battery costs and eliminate the dendrite problem.

What's more, the company has employed an **anode-less battery cell design** that eliminates anode manufacturing costs and brings QuantumScape's all-in battery costs to *17% lower* than all-in costs for traditional lithium-ion batteries.



Figure 1: Image of QuantumScape's Tray Design. Source: QuantumScape

The company has also developed a streamlined process for sourcing its materials which should allow for scalable and cost-effective solid-state battery manufacturing.

And by making it *far* cheaper and *far* easier to manufacture, it lends EVs a critical win in the battle to replace gas-powered vehicles.

Meanwhile, the company's proprietary design includes a ceramic electrolyte with high "**dendritic resistance**" – and therefore, QuantumScape's batteries don't have dendrite problems.

Thus, by addressing the two largest short-comings of solid-state battery chemistry, QuantumScape has positioned itself to create a new class of EV batteries that are **cheaper**, last **longer**, charge **faster** and are just overall a **better** solution than the Lithium-ion status quo.

This is more than just "talk." QuantumScape is backing it up with real-world data.

In December 2020, the company released performance data for its solid-state battery technology which broadly underscored that these batteries are a complete game-changer.



Figure 2: Image of QuantumScape's Cell Design. Source: QuantumScape

The data, based on testing of single layer battery cells, shows that QuantumScape's batteries:

- **Charge very quickly** — you can recharge them up to 80% capacity in just 15 minutes.
- **Last forever** — these batteries are capable of lasting hundreds of thousands of miles.
- **Work in any condition** — the batteries worked even in a test at -30 degrees Celsius.

Those are total game-changing features in the EV battery world.

If you don't believe me, then maybe you'll trust the word of **Dr. Stan Whittingham**, co-inventor of the lithium-ion battery and winner of the 2019 Nobel Prize in chemistry, who said:

"If QuantumScape can get this technology into mass production, it holds the potential to transform the industry."

Need I say more?

In addition to have the best technology in the solid-state battery industry, QuantumScape also has ample talent, resources, and partnerships to ensure that it sustains its technology edge.

The management team — headed by the former founder of Infinera and a Stanford grad — is essentially a **handpicked team of the best-of-the-best of Stanford and Berkeley physics grads**. Indeed, the company's Chief Scientific Officer is the Chair of Mechanical Engineering at Stanford.

Meanwhile, **Volkswagen** — the world's largest auto maker who is committed to electrifying its vehicle portfolio — has poured \$100 million into QuantumScape and is committed to using the company's solid-state batteries in its cars by 2025.

And the company's list of early investors includes Bill Gates. Yes. *That* Bill Gates.

At the same time, through a recent SPAC deal, QuantumScape will receive more than \$1 billion in cash and funding commitments. Volkswagen also has a lot of cash to throw at the company. So does Bill Gates.

Broadly, then, QuantumScape has sufficient resources to not worry about cash burn today and instead focus on the company's long-term goal of becoming a ubiquitous, best-in-breed supplier of solid-state batteries into the EV industry.

All in all, from head-to-toe, QuantumScape is ***as good as it gets*** when it comes solid-state battery companies.

And, to that extent, QuantumScape stock is the best way to play the solid-state battery disruption in EVs – which is, of course, an enormous disruption that will unlock hundreds of billions of dollars in economic value.

QuantumScape has a market cap of just \$15 billion today. That means the long-term upside in this name is **enormous** – so enormous that you may want to consider buying QuantumScape stock today.

Regards,

A handwritten signature in black ink, appearing to read 'Luke Lango', with a stylized, flowing script.

Luke Lango

Editor, ***Innovation Investor***